

Yankee Fork Chinook Salmon Supplementation Program – Update

LSRCP Program Review Presentation
November 30, 2010

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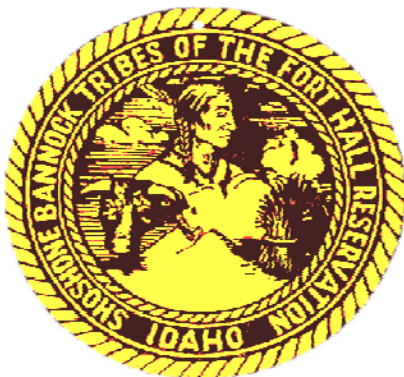


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Introduction

The Yankee Fork Chinook Salmon Supplementation (Yankee Fork) Program was initiated in 2006. The Yankee Fork program was developed with input from key individuals sitting in this room that have significant experience in the LSRCP Hatchery Program as well as BPA's Fish and Wildlife Program. With input from these individuals, the Yankee Fork Program was developed to incorporate the best available science and learn from adaptive management. Given that supplementation is a highly debated management strategy, the Yankee Fork program initiated monitoring and evaluation to document the successes or failures of supplementation. This is a summary of what has been accomplished thus far.

Overview

The goal of this presentation is to provide the necessary information to allow the audience to leave here today with a greater understanding of the Yankee Fork program, its relationship to the LSRCP, and how we intend to move forward. The presentation will orient you to the study area, provide information on the drainage statistics, and highlight important history which led to program implementation. The presentation also contains information on the programs goals and objectives, methods, results, and moving forward. Lastly we acknowledge the key cooperators in the program, as well as potential cooperators.

Study Area

Yankee Fork Salmon River is a major tributary to the Salmon River (Figure 1). Yankee Fork is located near the headwaters of the Salmon River about 15 miles downstream of the town of Stanley. The watershed is located in central-Idaho within lands administered by the U.S. Forest Service, Salmon-Challis National Forest.

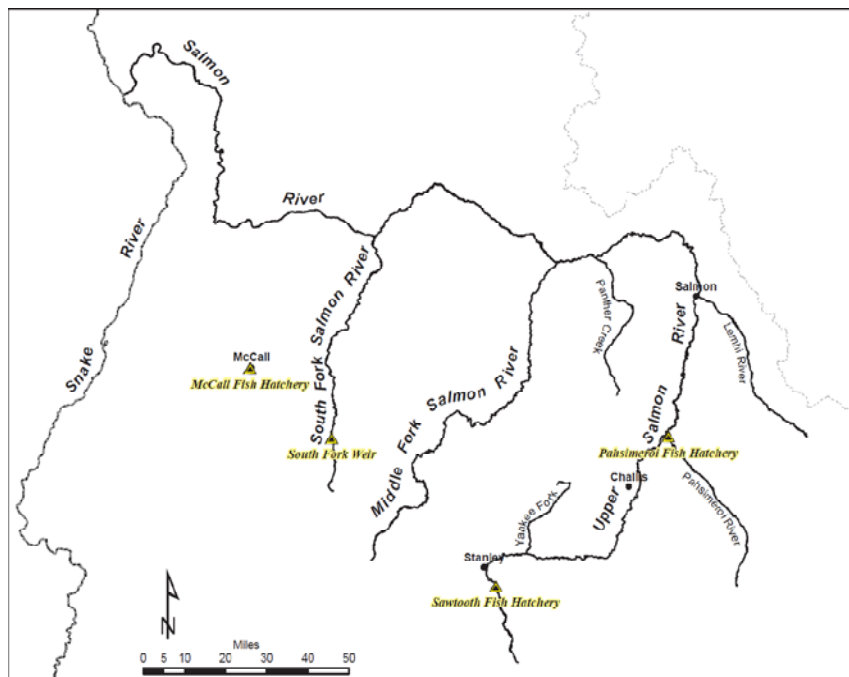


Figure 1. Location map of the Yankee Fork Salmon River and key hatchery facilities.

Yankee Fork is one of the nine populations of Snake River spring/summer Chinook salmon within the Upper Salmon Major Population Group (Figure 2). Yankee Fork is currently rated by the Interior Columbia-basin Technical Recovery Team (ICTRT) for high risk of extinction. The population is not replacing itself and the geometric mean abundance is 13 spawners; which is far from the recommended 500 spawners.

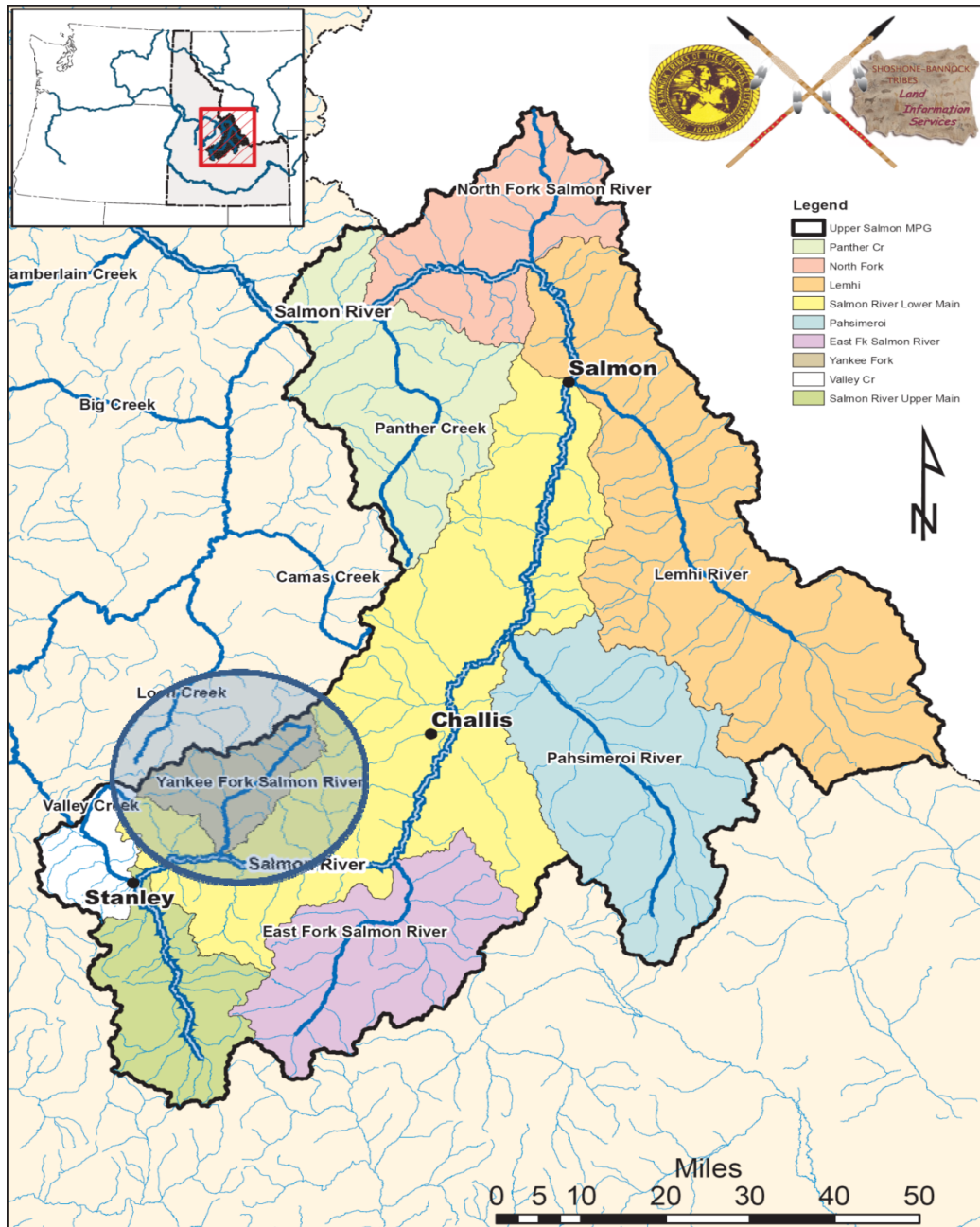


Figure 2. Map of the Snake River spring/summer Chinook salmon Upper Salmon River Major Population Group and Yankee Fork Salmon River population.

Mainstem Yankee Fork flows 42 km through narrow canyons and moderately wide valleys of lodgepole pine. The headwaters originate at an elevation of 2,500 meters. The drainage is

composed of 313 square kilometers and includes 10 major tributaries. Average precipitation is 68.6 centimeters and is mostly from snow, base flows are 1.13 m³/s and mean flows are 6.99 m³/s.

History

So why are the Tribes supplementing the Yankee Fork Chinook salmon population? In 1977, when Chinook salmon runs across Idaho began to dwindle, the Tribes established sanctuary areas in the Salmon River to allow rebuilding to occur. At the time, the belief was if we stopped fishing, the runs could rebuild. This was a noble philosophy, but our harvest was miniscule, when compared to downriver harvest and mortality associated with fish migrating through the lower Snake and Columbia river hydropower systems. In any event, the Tribes believed this was the right thing to do. About that same time frame, Yankee Fork, along with several other tributaries were designated as permanent areas for Tribal fishing. Fish were released to support Tribal fishing. Over time, as many as three different stocks of fish were released into Yankee Fork as fry, parr, pre-smolt, smolt, and adult with nearly 2.8 million fish released (Table 1). Fish were released from 1977 – 1991, but once the ESA listing was passed in 1992, hatchery fish were not released into Yankee Fork to support Tribal fishing opportunity.

Table 1. Yankee Fork Salmon River Chinook salmon production history, 1977 – 1991.

BY	RY	Number	Location	Stock	Size	fish/lb	Hatchery
	1977	56,700	WFYK		fry-fingerling		Mackay
	1978	75,036	Yankee Fork		fry-fingerling		Mackay
	1985	61	Yankee Fork	Sawtooth	adult		Sawtooth
	1985	659	Yankee Fork		adult		Pahsimeroi
	1986	61	Yankee Fork	Sawtooth	adult		Sawtooth
	1986	1,505	Yankee Fork		adult		Pahsimeroi
	1986	386,348	Yankee Fork		fry-fingerling		Pahsimeroi
	1987	157,877	Yankee Fork		fry-fingerling		Sawtooth
	1987	600	Yankee Fork		adult		Pahsimeroi
1986	1987	158,000	Yankee Fork Ponds	Salmon R.	pre-smolt	250	Sawtooth
1986	1988	725,500	Yankee Fork Ponds	Pahsimeroi	smolt	20	Sawtooth
1987	1988	50,100	Yankee Fork Ponds		fry-fingerling	120	Sawtooth
1987	1989	198,200	Yankee Fork Ponds	Salmon R.	smolt	24	Sawtooth
1988	1989	125,000	Yankee Fork Ponds	Salmon R.	fry-fingerling	100	Sawtooth
1988	1990	200,800	Yankee Fork Ponds	Salmon R.	smolt	21	Sawtooth
1989	1990	50,000	Yankee Fork Ponds		fry-fingerling	100	
1989	1990	491,300	Yankee Fork	Salmon R.	smolt	45	Sawtooth
1989	1990	50,000	Yankee Fork Ponds	Salmon R.	fry-fingerling	111	Sawtooth
1990	1991	50,000	Yankee Fork Ponds		fry-fingerling	120	Sawtooth

Fast forward to today, and like all co-managers, the Tribes are interested in providing a fishery in Yankee Fork. There are a few other places where Tribal members can go and actually see a fish and currently, Yankee Fork is not one of those areas. In order to provide a meaningful fishery, the Tribes view hatchery supplementation as a short-term option for increasing abundance to meet the Tribes' harvest and conservation objectives. The Tribes plan is to ensure natural fish in Yankee Fork are restored, therefore our supplementation efforts focus on providing natural spawning escapement. Our long-term management strategies also include restoring habitat, managing harvest, and monitoring and evaluating our activities to learn from our results.

Annual redd counts are presented below, prior to Yankee Fork program supplementation, from 1952 – 2007 (Figure 3) to demonstrate the continued decline of the population. Shortly after the last dams were installed in the lower Snake River, Yankee Fork Chinook salmon abundance severely declined and never rebounded. This figure shows a peak count of 615 redds in 1968 to zero redds in 1984 and 1995. These estimates do not account for harvest, which was substantial prior to 1970 and truly insignificant since then.

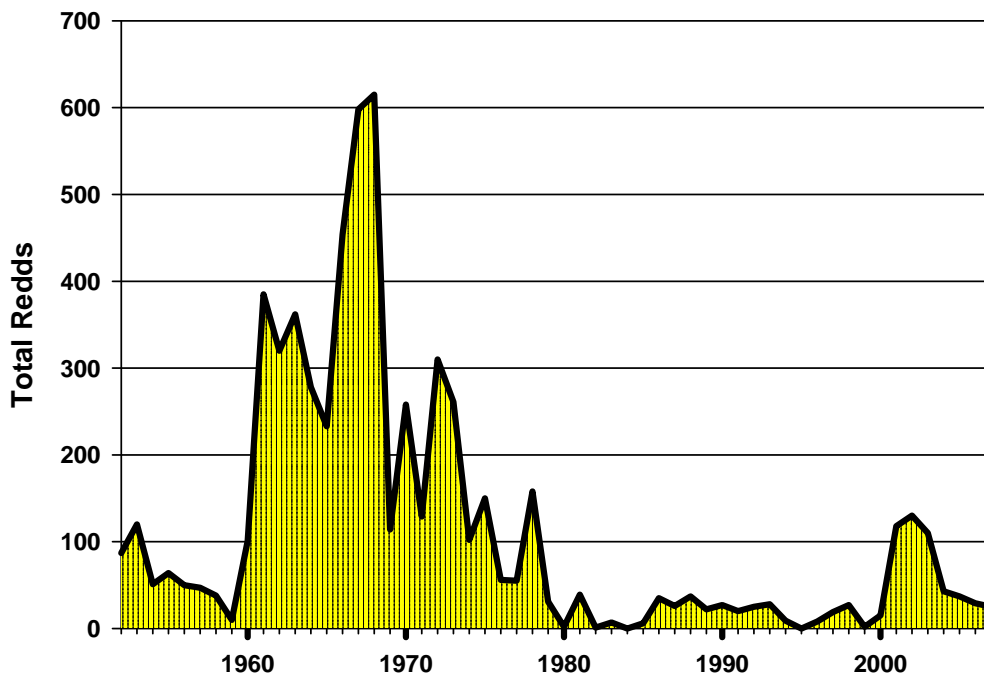


Figure 3. Annual redd counts conducted in the Yankee Fork Salmon River from 1952-2007.

Looking closer at the redd count data from the previous figure. We plotted a redd frequency distribution to highlight the skewed distribution of redds observed from 1952 – 2007, which is 56 years of information (Figure 4). Since counting was initiated, 35 out of the 56 years, or 63% of the time, less than one hundred redds have been observed. A healthy population should have a normal distribution curve, which is not the case in Yankee Fork. Further analysis, reveals the 0 - 10 redds is the most common distribution frequency for Yankee Fork, with ten years of data (Figure 5). This information supports the conclusions by the ICTRT; Yankee Fork Chinook

salmon are at high risk of extirpation and highlights the need for an aggressive restoration approach, such as supplementation.

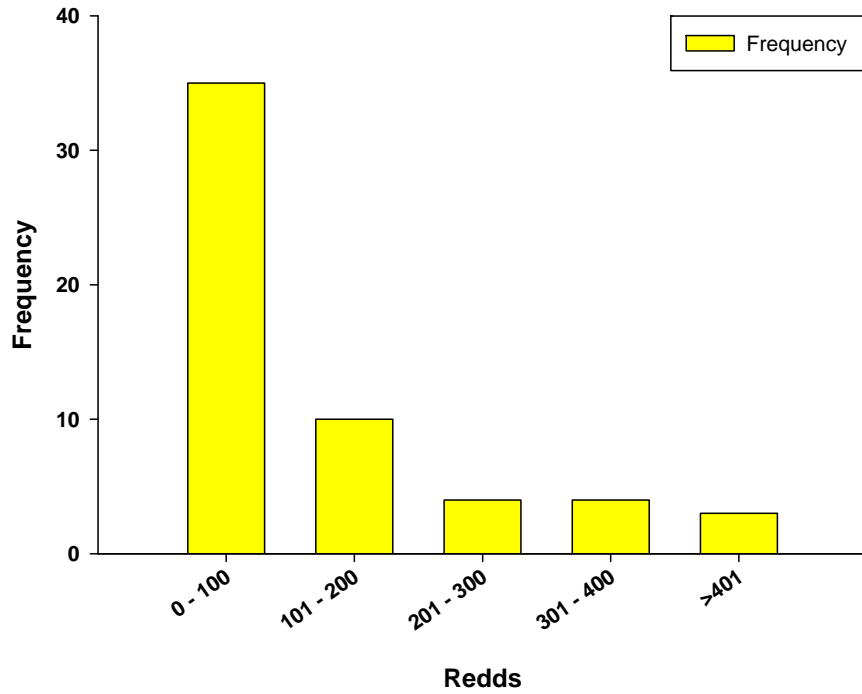


Figure 4. Yankee Fork Chinook salmon redd frequency histogram, 1952 – 2007.

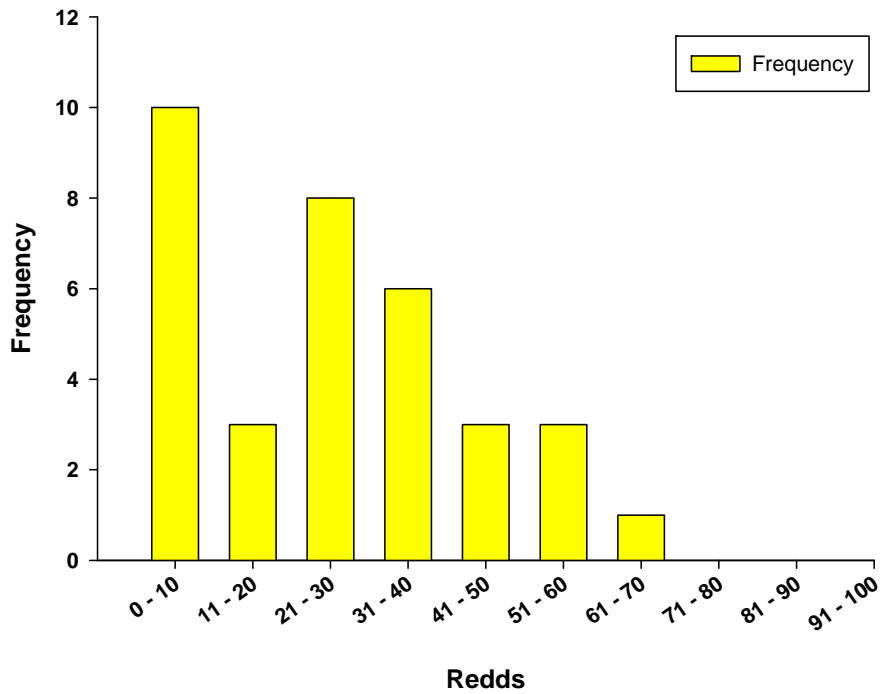


Figure 5. Yankee Fork Chinook salmon redd frequency (1 – 100) histogram, 1952 – 2007.

Goals and Objectives

The Tribes are working to achieve the long-term goal of returning 2,000 adult Chinook salmon to the Yankee Fork. We believe adult returns to the Yankee Fork will help the LSRCP meet its adult return mitigation goals. In order to attain broodstock to meet the adult return goal, the Tribes first phase is to develop a locally-adapted Chinook salmon run. Since there are very few natural-origin adults returning to Yankee Fork, we plan to jump start the population with the release of up to 1,500 pre-spawn adults and 200,000 – 400,000 smolts, obtained from Sawtooth Fish Hatchery. Sawtooth hatchery fish will crossbred with the naturally returning Yankee Fork adults. Once the locally adapted run is developed, broodstock will be collected entirely from the crossbred natural-origin returning adults to Yankee Fork.

The Tribes long-term adult goal is divided into four objectives. The conservation objective will provide 750 adults for natural spawning and contribute to recovery of the Snake River spring/summer Chinook salmon ESU by restoring Yankee Fork to a “maintained” population of local Chinook salmon. All aspects of the program will be consistent with the ESA and HSRG/HRT review criteria. The harvest objective will provide up to 1,000 adults for harvest in Columbia, Snake, Salmon, and Yankee Fork fisheries. The Tribes also want to ensure that Tribal harvest in the Yankee Fork can be achieved by traditional hunting methods. Traditional hunting methods include spear fishing, netting, and snagging. To ensure the adult return goal is attained, the Tribes are seeking to utilize adult fish for broodstock to produce 200,000 – 400,000 smolts for release until Crystal Springs Fish Hatchery is constructed. Once Crystal Springs Fish Hatchery is constructed, smolt production will increase to meet the necessary release target of ~600,000 smolts to meet all adult return objectives. The Crystal Springs Fish Hatchery is currently in the Northwest Power and Conservation Council’s 3-step planning process.

Study Design

The Tribes plan to utilize a treatment and control study design to monitor and evaluate the program. Select treatment tributaries will be utilized to evaluate supplementation and may include the following supplementation projects: 1) South Fork Salmon River, Upper Salmon River, Pahsimeroi River, and Johnson Creek. Our control streams will be selected from streams already being evaluated for supplementation under the Idaho Supplementation Studies, since data is already being collected. We plan to investigate and evaluate the interactions between natural and hatchery-origin fish in the Yankee Fork. Our study design will allow us to track performance of multiple groups of fish within Yankee Fork and compare this performance to natural only control streams.

Methods

The primary methods employed by the Program in order of season implementation, include operating a rotary screw trap, releasing smolts, operating two portable picket weirs, conducting adult trapping, conducting harvest monitoring, outplanting adults and conducting spawning ground surveys.

Rotary Screw Trap

A rotary screw trap is installed in lower Yankee Fork and operated from April through November, pending conditions (Figure 6). At the screw trap, species are enumerated and biological data collected. A proportion of juvenile Chinook salmon are PIT tagged or stained for mark-recapture and survival through the FCRPS. We also collect tissue samples from all PIT tagged fish to compare performance between unknown hatchery and natural-origin fish.



Figure 6. Yankee Fork rotary screw trap.

Smolt Release

In mid-April, juvenile fish reared at Sawtooth are transported to Yankee Fork for release (Figure 7). Currently, there are 400,000 juvenile Chinook salmon being reared at Sawtooth, but the long-term production number is still being discussed. Approximately 50% of the juveniles are adipose fin-clipped, with the other 50% having intact adipose fins. Both groups, clipped and non-clipped received approximately 2,200 PIT tags. All fish with intact adipose fins are coded wire tagged for identification. Smolt releases are paired to compare performance from direct stream releases to semi-acclimated releases. Juvenile survival through the FCRPS and adult returns will be evaluated.



Figure 7. Yankee Fork Chinook salmon smolt release.

Weirs

In late June the Tribes erect two portable picket weirs to collect broodstock and segregate the spawning aggregate. The Pole Flat Weir is located approximately 5.2 rkm upstream from the

confluence with the Salmon River and Five Mile Weir is 21.5 rkm upstream. Both weirs are v-shaped structures with an attached trap box to hold captured adults (Figure 8).

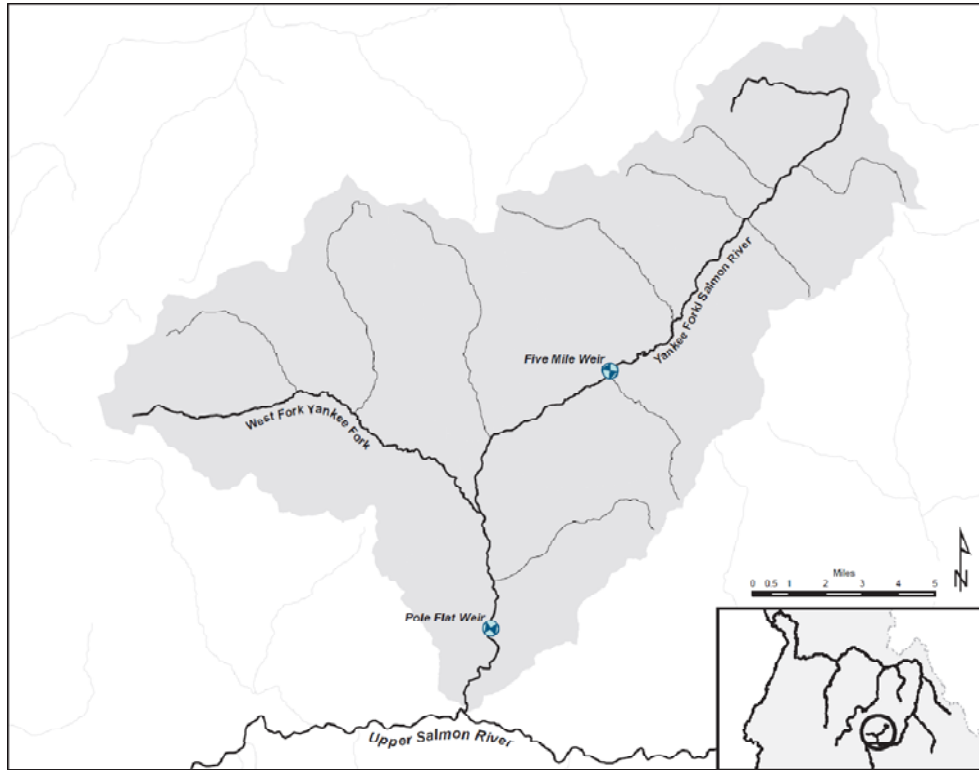


Figure 8. Map of Yankee Fork Salmon River and location of two portable picket weirs.

Adult Trapping

Normal trapping protocols are followed at both weirs. We enumerate species, collect broodstock, collect tissue samples, and standard biological information including length, gender, and origin (Figure 9). All fish are scanned for internal tags. Five Mile Weir is used to segregate hatchery fish from spawning in West Fork Yankee Fork and confounding the ISS study.



Figure 9. Adult Chinook and sockeye salmon trapped at Pole Flat weir.

Harvest Monitoring

Harvest monitoring is conducted on a daily basis. Since very few fish are currently returning to Yankee Fork, this is a relatively easy task. Tribal staff monitor the fishery from June 25 through August 11. All Tribal members encountered are surveyed (Figure 10).



Figure 10. Harvest monitors and Tribal fisherman.

Adult Outplanting

Adults are outplanted in upper Yankee Fork above Five Mile Creek Weir (Figure 11). The annual objective is to obtain 1,500 adults from Sawtooth Fish Hatchery. We strive to achieve a sex ratio of 60% males, of which 5% can be jacks, and 40% females. Prior to outplanting, all hatchery adult outplants are tissue sampled and biological data collected for parentage analysis studies.



Figure 11. Outplanting hatchery Chinook salmon in upper Yankee Fork.

Spawning Ground Surveys

Spawning ground surveys are completed annually. Surveyors walk the entire spawning habitat identifying redds and collecting spawned out carcasses. Four total passes are completed each year and efforts are coordinated with IDFG personnel working in West Fork Yankee Fork, as part of IDFG Captive Chinook Program. Each redd is recorded and gps taken to document spawn

timing, redd enumeration, and distribution (Figure 12; Figure 8). Carcasses are collected for key biological information, and are useful to determine percent spawned, age structure, and for mark-recapture estimates.



Figure 12. Female Chinook salmon on redd in Yankee Fork Salmon River.

Results

Rotary Screw Trap

Since initiating the program, approximately 534,024 (SE 17,348) BY 2008 and 129,661 (SE 5,619) BY 2009 juvenile Chinook salmon were estimated (Figure 13). Our estimates are considered minimum since we were unable to quantify BY 08 fry and smolt and our BY 09 estimates for fry and parr only represent 12% of the normal trapping season. In BY 08, approximately 305,722 (SE 8,546) parr and 228,252 (SE 20,670) pre-smolt were estimated. In BY 09, approximately 46 (SE 10) fry, 15,114 (SE 3,369) parr, and 114,501 (SE 7,627) pre-smolt were estimated. Again, there was insufficient information to estimate BY 08 fry and smolt and the estimates for BY 09 fry and parr is extremely limited. We were unable to estimate BY 08 fry because we did not have a screw trap. The screw trap was compromised as a result of high water in 2009 and we were unable to sample this spring period to develop precise and accurate estimates for BY 08 smolt, BY 09 fry, and BY 09 parr.

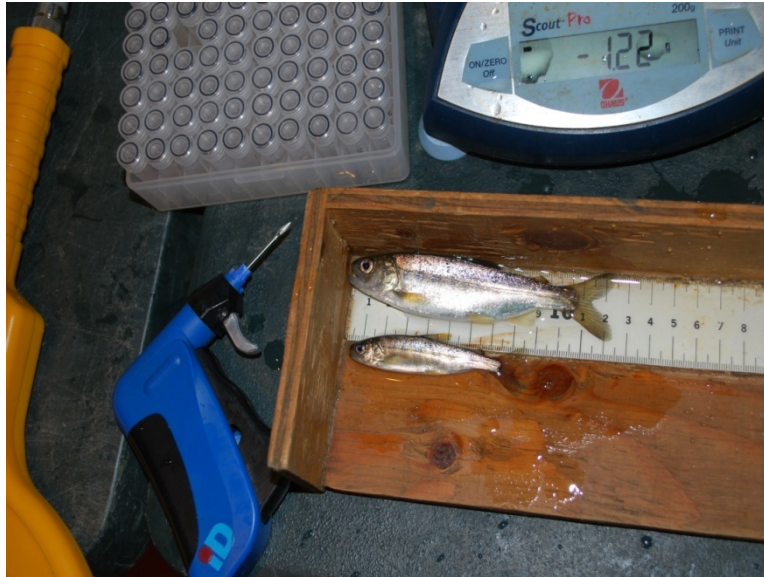


Figure 13. Juvenile Chinook salmon (pre-smolt) collected in the Yankee Fork Salmon River.

Smolt Release

The Yankee Fork program has released smolts in 2006 and 2010, respectively. The first release occurred in 2006 with 135,934 BY 04 Chinook salmon (Table 2; Figure 14). The second release occurred this spring with 398,444 smolts from BY 08 Chinook salmon. Adult returns from the 2006 release are complete and a total of 381 hatchery adults returned to Yankee Fork for an SAR of 0.28%. This estimate does not include the number of jacks that returned in 2007. Adults from the BY08 release are expected to return in 2011 – 2013.

Table 2. Smolt release numbers and returning adults.

Brood Year	Number Released	Year Released	Return Age From BY			Total	SAR (%)
			1-ocean	2-ocean	3-ocean		
2004	135,934	2006	NA	357	24	> 381	> 0.280
2008	398,444	2010					



Figure 14. Smolt loading at Sawtooth Fish Hatchery and unloading at Yankee Fork.

Adult Trapping, Outplants, and Redds

Since initiating the Yankee Fork program in 2008, an average of 1,213 fish have spawned yearly. The spawning escapement is made up from naturally returning natural fish, returning hatchery fish, strays, and outplanted hatchery fish. Approximately, 2,955 hatchery adults obtained from

Sawtooth Fish Hatchery were outplanted in upper Yankee Fork in 2008 – 2009 (Table 3). In 2010, returns to Sawtooth were insufficient and no hatchery adults were outplanted. Since 2008, we trapped a total of 205 hatchery fish and 89 natural fish, for an average of 30 natural-origin fish per year. Adult migration typically begins prior to installation of the weirs, since flows are not typically safe for installation. A total of 163 fish passed the structures without being detected and 228 spawned below the Pole Flat Weir.

Table 3. Number of adult Chinook salmon contributing to spawning escapement and redd production.

Year	Adult Outplants	Trapped at Lower Weir		Passed Weir Undetected	Spawned Below Lower Weir	Spawning Escapement	Redds
		Hatchery Origin	Natural Origin				
2008	1,438	185	43	125	144	1,935	660
2009	1,517	20	29	2	72	1,640	414
2010	0	0	17	36	12	65	28

Run-Timing

Run-timing for natural and hatchery fish appear to be different, but both groups exhibit bi-modal run-timing distribution (Figure 15). There are more natural fish returning early in the year as compared to hatchery fish and more hatchery fish returning later in the year than natural fish.

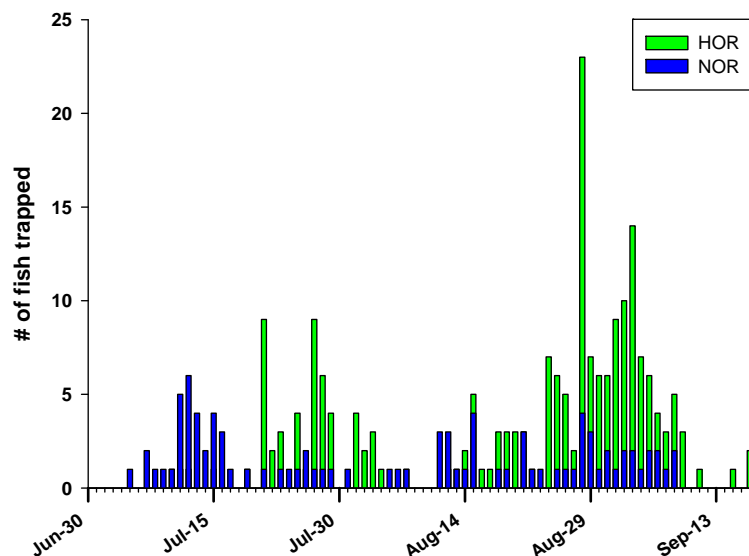


Figure 15. Run-timing of Yankee Fork hatchery and natural Chinook salmon.

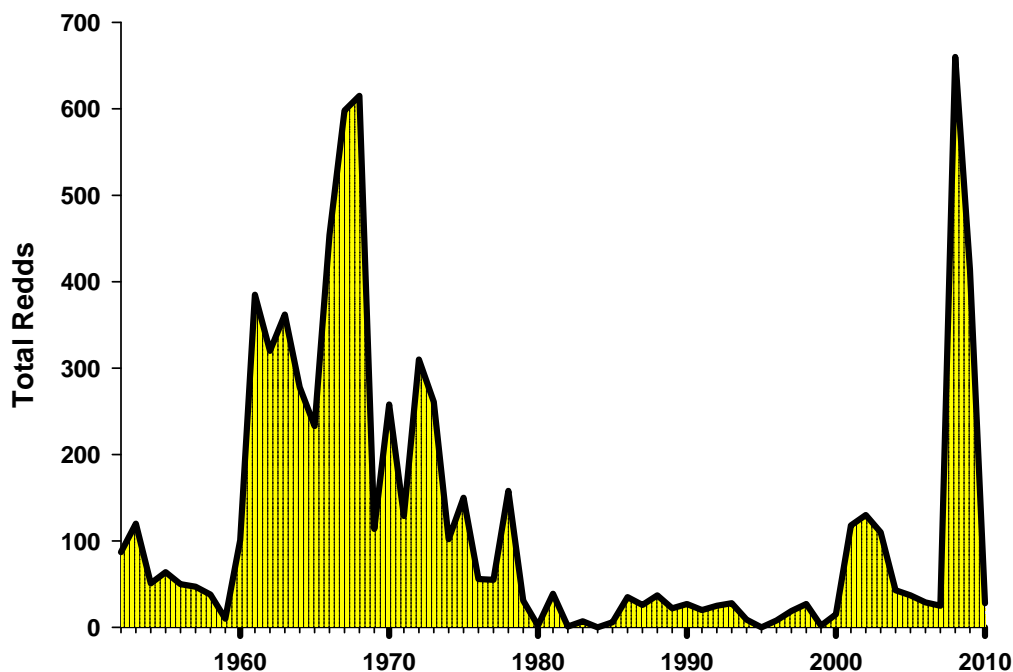
Harvest Monitoring

We have recorded only a handful of Tribal fisherman efforts each year in Yankee Fork since 2008. The majority of Tribal members are currently fishing below Sawtooth Fish Hatchery, in

the South Fork Salmon River, or Bear Valley Creek. This highlights the importance of two LSRCF facilities and one natural production area at producing Tribal harvest opportunities. We anticipate harvest will increase substantially in Yankee Fork once returns begin to increase as a result of supplementation. Since 2008 a total of four natural-origin Chinook salmon have been harvested. One adult was caught in 2008 and 2010 and two were caught in 2009. The Tribal fisheries were curtailed in the areas where adult hatchery Chinook salmon were outplanted.

Spawning Ground Surveys

In 2008, 2009, and 2010, a total of 660, 414, and 28 redds were recorded for an average of 367 redds per year (Figure 16). The proportion of hatchery-origin spawners (pHOS) from 2008 – 2010 was 95%, 98%, and 0%, respectively.



Moving Forward

The Tribes are moving forward with the Yankee Fork program and are thankful the LSRCF has provided key funds for O&M and M&E. We are hopeful that the adult returns to Yankee Fork will help the LSRCF come closer to meeting their mitigation goals. We are also hopeful that we will be able to utilize Bonneville Power Administration (BPA) funds, acquired through our fish accord for supplementation activities such as Yankee Fork.

We are currently in the Northwest Power and Conservation Councils' Categorical Review process with the Independent Scientific Review Panel for expanded monitoring and evaluation funds for this program. The expanded funds will allow us to complete parentage analysis studies to reveal the relative reproductive success of naturally spawning hatchery and natural-origin

Chinook salmon in Yankee Fork. Funds will also be used to provide an on-site residence for program staff. In addition, funding may be utilized to collect additional data in control streams. The Tribes are also working on the development of the Crystal Springs Fish Hatchery. We have met with IDFG, LSRCP, and NOAA-Fisheries staff to refine plans for Yankee Fork, its relationship to Sawtooth and the overall goals of the Crystal Springs Fish Hatchery. The Crystal Springs Fish Hatchery proposal includes plans for constructing adult trapping and holding facility in Yankee Fork, as well as an improved weir.

We plan to continue to work with NOAA-Fisheries to process our HGMPs and TRMPs. We are also planning to publish our results in scientific journals. And lastly, we recognize the Program limitations and hope we can continue to move forward in a positive manner.

Acknowledgments

We would like to acknowledge the support we received from the Shoshone-Bannock Tribes Fort Hall Business Council and key program staff including Carlos Lopez, Alex Graves, Scott Brandt, Brock Moss & the numerous staff that assisted with the program over the years. We are especially thankful to Scott Marshall, Steve Yundt, Chris Starr, Joe Krakker, Margaret Anderson and Tammy Froscher at the Lower Snake River Compensation Plan – Office for their support of the program, both financially and fundamentally. We would like to thank Idaho Department of Fish & Game including Pete Hassemer, Sam Sharr, and Tom Rodgers at headquarters; Brent Snider, Mel Hughes, and Danielle Dorsch at Sawtooth Fish Hatchery. We would like to thank NOAA-Fisheries and the US Forest Service for supporting this Tribal supplementation program. And lastly, we are hopeful that BPA will become a program sponsor. Funding from BPA for the project was negotiated in our Fish Accord and the Tribes' Supplementation Program is currently being reviewed by the ISRP through the Council's Categorical Review.